GREATER NEW HAVEN WPCA
CSO FLOW MONITORING PROGRAM
METER LOCATION SUMMARY
OCTOBER 2013

0F-006 SEWER, OVERFLOW AA AND OVERFLOW BB

- Meter OF-006 Sewer was installed in the 36 inch sewer upstream of the two overflow pipes on 6/4/12 at an invert elevation of 8.25 (overflow depth is 27 inches)
- Meters OF-006 Overflows AA and BB were installed in the twin 24 inch overflow pipes on 7/30/12 at an invert elevation of 10.54
- CSO start and stop times are based on a depth greater than 27 inches at Meter OF-006 Sewer and positive velocities at Meters OF-006 Overflows AA and BB
- CSO volumes are calculated based on depths and velocities at Meters OF-006 Overflows AA and BB, the hydraulic elements chart and the Continuity Equation

0F-005 SEWER AND OVERFLOW

- Meter OF-005 Sewer was installed in the 57 inch high by 60 inch wide sewer at REG 005 6/7/12 at an invert elevation of 5.44 (overflow depth is 53.5 inches)
- Meter OF-005 Overflow was installed in the 48 inch overflow pipe on 6/7/12 at an invert elevation of 8.40
- CSO start and stop times are based on a depth greater than 53.5 inches at Meter OF-005 Sewer and positive velocities at Meter OF-005 Overflow
- CSO volumes are calculated based on depths and velocities at Meter OF-005 Overflow, the hydraulic elements chart and the Continuity Equation
- Flows from the 48 inch combined sewer in Derby Avenue “jump” the regulator during peak wet weather events

0F-004 SEWER AND OVERFLOW

- Meter OF-004 Sewer was installed in the 64 inch high by 72 inch wide sewer downstream of REG 004 6/6/12 at an invert elevation of 4.05 (overflow depth is 35 inches)
- Meters OF-004 Overflow was installed in the 3 foot high by 5 foot wide box culvert overflow on 6/6/12 at an invert elevation of 4.81
- The regulator consists of three weirs, each two feet wide
- CSO start and stop times are based on a depth greater than 35 inches at Meter OF-004 Sewer and positive velocities at Meter OF-004 Overflow
- CSO volumes are calculated based on depths and velocities at Meter OF-004 Overflow, the hydraulic elements chart and the Continuity Equation

0F-003 SEWER AND OVERFLOW

- Meter OF-003 Sewer was installed in the 64 inch high by 72 inch wide sewer downstream of REG 003 on 6/5/12 at an invert elevation of 2.39 (overflow depth is 46 inches)

- Meter OF-003 Overflow was installed in the 54 inch overflow pipe on 6/5/12 at an invert elevation of 2.75
- The regulator consists of an 5 foot long transverse weir
- CSO start and stop times are based on a depth greater than 46 inches at Meter OF-003 Sewer and positive velocities at Meter OF-003 Overflow
- CSO volumes are calculated based on depths and velocities at Meter OF-003 Overflow, the hydraulic elements chart and the Continuity Equation
- There is significant tidal influence at Meter OF-003 Overflow
- In order to account for the tidal depths being included in the CSO volume calculations, it is proposed to use the depths measured at Meter OF-003 Sewer when they exceed the weir elevation, the hydraulic elements chart and the Continuity Equation
- An alternative would be to use the depths measured at Meter OF-003 Sewer when they exceed the weir elevation and the weir formula

GNH1 SEWER AT TRUMAN TANK

- Meter GNH1 Sewer was installed in the 64 inch high by 72 inch wide sewer downstream of the Truman Tank Diversion Chamber on 6/12/12 at an invert elevation of 1.29 (there is 14 inches of hard packed sediment in the Diversion Chamber) (overflow depth is 36 inches)
- The regulator is a 10 foot bending weir
- The SCADA system measures depths in each cell of the 5 MG tank
- Truman Tank activation start and stop times are based on a depth greater than 36 inches at Meter GNH1 Sewer and SCADA depths in the Truman Tank
- CSO volumes are calculated based on SCADA depths in the Truman Tank

0F-024 US and DS SEWER AND REG 024 WEIR

- Meter OF-024 US Sewer was installed in the 69 inch high by 84 inch wide sewer upstream of REG 024 on 7/30/12 at an invert elevation of -1.17 (overflow depth is 65 inches)
- Meter OF-024 DS Sewer was installed in the 48 inch sewer downstream of REG 024 on 7/30/12 at an invert elevation of -2.72 (overflow depth is 81 inches)
- Meter 024 Weir was installed to measure weir depth at REG 024 on 10/31/12 at the weir elevation of 4.40
- The regulator consists of three weirs each 4.5 feet wide
- CSO start and stop times are based on depths greater than 65 inches at Meter OF-024 US Sewer, depths greater than 81 inches at Meter OF-024 DS Sewer (verified by the Meter 024 Weir depths)
- CSO volumes are calculated by subtracting the Meter 024 DS Sewer flows from the Meter 024 US Sewer flows

OF-025 OVERFLOW - (THIS METER WAS REMOVED IN SEPTEMBER 2013)

- Meter OF-025 Overflow was installed in REG 025 on 12/12/12 at an invert elevation of 4.65 (overflow depth is 21 inches)

- The regulator consists of a 45 inch wide weir at elevation 6.40
- CSO start and stop times are based on a depth greater than 21 inches at REG 025
- CSO volumes are calculated based on depth over the 45 inch weir at REG 025 using the weir formula

REG 025 (METERS State, Frontage, Union and DS) (CSO 025)

- Four meters were installed in September 2013 to estimate CSOs at REG 025
- Meter State was installed in the 48 inch wide by 60 inch high sewer on State Street upstream of REG 025
- Meter Frontage was installed in the 30 inch sewer on North Frontage Road upstream of REG 025
- Meter Union was installed in the 36 inch sewer on State Street upstream of REG 025
- Meter REG 025 DS was installed in the 42 inch discharge pipe downstream of REG 025 and the State/Union Pump Station
- CSO start and stop times are estimated by summing the flows from the three upstream meters and subtracting the flows from the downstream meter (anytime the resultant flow is greater than zero a CSO is occurring)
- CSO volumes are estimated using the resultant flows as calculated above

REG 034 SEWER AND OVERFLOW – (THIS METER WAS REMOVED IN SEPTEMBER 2013)

- Meter REG-034 Sewer was installed in the 48 inch sewer at REG 034 on 3/27/13 at an invert elevation of 11.45 (overflow depth is 15 inches)
- Meter REG-034 Overflow was installed on the overflow weir on 3/27/13
- The regulator consists of a 78 inch weir at elevation 12.70
- CSO start and stop times are based on a depth greater than 15 inches at REG 034
- CSO volumes are calculated based on depth over the 78 inch weir at REG 034 using the weir formula

REG 034 (METERS Temple, George, and DS) (CSO 025)

- Three meters were installed in September 2013 to estimate CSOs at REG 034
- Meter Temple was installed in the 20 inch wide by 30 inch high sewer on Temple Street upstream of REG 034
- Meter George was installed in the 36 inch wide by 48 inch high sewer on George Street upstream of REG 034
- Meter REG 034 DS was installed in the 30 inch discharge pipe downstream of REG 034
- CSO start and stop times are estimated by summing the flows from the two upstream meters and subtracting the flows from the downstream meter (anytime the resultant flow is greater than zero a CSO is occurring)
- CSO volumes are estimated using the resultant flows as calculated above

OF-013 SEWER AND OVERFLOW – (THIS METER WAS REMOVED IN SEPTEMBER 2013)

- Meter OF-013 Sewer was installed in the 30 inch high by 45 inch wide sewer at REG 013 on 3/15/13 at an invert elevation of 20.20 (overflow depth is 25 inches)
- Meter OF-013 Overflow was installed on the overflow weir on 3/15/13
- The regulator is a 25 inch wide weir
- CSO start and stop times are based on a depth greater than 25 inches at REG 013
- CSO volumes are calculated based on depth over the 25 inch weir at REG 013 using the weir formula
- We plan to close OF-013 as recommended in the CSO LTCP

0F-012 OVERFLOW A AND B

- Meters OF-012 Overflows A and B were installed in the twin 18 inch overflow pipes on 10/15/12 at an invert elevation of 14.20 (overflow depth in the 48 inch sewer is only 36 inches)
- The 36 inch by 55 inch sewer downstream of REG 012 is a hydraulic bottleneck
- Spring flows from the Mill River Trunk Sewer in Hamden contain significant amounts of I/i
- CSO start and stop times are based on positive velocities at Meters OF-012 Overflows A and B
- CSO volumes are calculated based on depths and velocities at Meters OF-012 Overflows A and B, the hydraulic elements chart and the Continuity Equation
- New 6 inch high weirs were installed in each 18 inch overflow pipes on 5/3/13

REG 028 AT MITCHELL DRIVE PUMP STATION

- Regulator 028 is a 15 inch overflow pipe from the Mitchell Drive PS wetwell to CSO 012
- The SCADA system monitors the depth in the wetwell
- No overflows occurred in 2012 (including the 5 year storm on 9/28/12)
- Plan is to replace the pumps with grinder pumps, add an emergency generator receptacle, and then close the CSO

OF-010 SEWER – (THIS METER WAS REMOVED IN SEPTEMBER 2013)

- Meter OF-010 Sewer was installed in the 54 inch sewer at REG 010/010A on 12/20/12 at an invert elevation of 8.47 (overflow depth is 57 inches)
- The regulator is a 46 inch wide weir
- CSO start and stop times are based on a depth greater than 57 inches at REG 010/010A
- CSO volumes are calculated based on depth over the 46 inch weir at REG 010/010A using the weir formula
- We plan to close CSO 010 as recommended in the CSO LTCP

REG 010A OF-010 SEWER (CSO 011)

- Meter OF-010 Sewer was installed in the 54 inch sewer at REG 010/010A on 12/20/12 at an invert elevation of 8.47 (overflow depth is 62 inches)
- The regulator is a 114 inch wide weir
- CSO start and stop times are based on a depth greater than 62 inches at REG 010/010A

- CSO volumes are calculated based on depth over the 114 inch weir at REG 010/010A using the weir formula

REG 014 SEWER AND OVERFLOW (CSO 011) – (THIS METER WAS REMOVED IN SEPTEMBER 2013)

- Meter REG 014 Overflow was installed on the weir in the 48 inch overflow pipe on 10/3/12
- Meter OF-014 Sewer was installed in the 66 inch sewer at REG 014 on 12/20/12 at an invert elevation of 12.40 (overflow depth is 54 inches)
- The regulator is a 44 inch wide weir
- CSO start and stop times are based on a depth greater than 54 inches at REG 014
- CSO volumes are calculated based on depth over the 44 inch weir at REG 014 using the weir formula
- We plan to close REG 014 based on the metering data

REG 011 (METERS 0F-011-997, 609, 631 AND 819) (CSO 011)

- Four meters were installed in December 2012 to estimate CSOs at REG 011
- Meter OF-011-997 was installed in the 30 inch sewer on State Street upstream of the 42 inch discharge pipe– **(THIS METER WAS REMOVED IN SEPTEMBER 2013)**
- Meter OF-011-609 was installed in the 37 inch wide by 25 inch high sewer on Humphrey Street upstream of REG 011– **(THIS METER WAS REMOVED IN SEPTEMBER 2013)**
- Meter OF-011-631 was installed in the 66 inch sewer on State Street upstream of REG 011
- Meter OF-011-819 was installed in the 42 inch discharge pipe downstream of REG 011 and Meter O-011997
- CSO start and stop times are estimated by summing the flows from the three upstream meters and subtracting the flows from the downstream meter (anytime the resultant flow is greater than zero a CSO is occurring)
- CSO volumes are estimated using the resultant flows as calculated above

REG 026 AT HUMPHREY STREET PUMP STATION

- Regulator 026 is a 10 inch overflow pipe from the Humphrey Street PS wetwell to CSO 011
- The SCADA system monitors the depth in the wetwell
- No overflows occurred in 2012 (including the 5 year storm on 9/28/12)
- Plan is to replace the pumps and then close the CSO

OF-GREENE SEWER AND OVERFLOW – (THIS METER WAS REMOVED IN SEPTEMBER 2013)

- Meter OF-Greene Overflow was installed in REG Greene on 8/15/12 at an invert elevation of 5.72 (overflow depth is 72 inches)
- Meter OF-Greene Sewer was installed in the 24 inch sewer at REG Greene on 3/25/13 at an invert elevation of 5.72 (overflow depth is 72 inches)
- The regulator is a 15 inch pipe
- CSO start and stop times are based on a depth greater than 72 inches at REG Greene

- CSO volumes are calculated based on depth over the 72 inches at REG Greene using the hydraulic elements chart and the Continuity Equation
- We plan to close OF-GREENE based on the metering data

REG 021-OF AND OF-021 US SEWER (E ST PS SEWER)

- Meter OF-021 US Sewer (E St PS) was installed in the 62 inch wide by 67 inch high sewer upstream of REG 021 on 9/13/12 at an invert elevation of 0.10 (overflow depth is 75 inches)
- Meter OF-021 was installed in REG 021 on 11/15/12 at an invert elevation of -0.97 (overflow depth is 88 inches)
- The regulator is twin 84 inch wide steel plate weirs at elevation 6.34
- There is a duckbill on the overflow pipe
- CSO start and stop times are based on a depth greater than 88 inches at REG 021
- CSO volumes are calculated based on depth over the twin 84 inch weirs at REG 021 using the weir formula

OF-009 OVERFLOW

- Meter OF-009 Overflow was installed in the 30 inch wide by 45 inch high overflow pipe on 10/3/12 at an invert elevation of 3.50
- The regulator consists of an 5.5 foot long weir at an elevation of 5.70
- CSO start and stop times are based on a positive velocities at Meter OF-009 Overflow
- CSO volumes are calculated based on depths and velocities at Meter OF-009 Overflow, the hydraulic elements chart and the Continuity Equation
- There is significant tidal influence at Meter OF-009 Overflow (no duckbill)
- Unlike OF-003, there is not a meter in the sewer to use an alternative check on Meter OF-009 Overflow
- Some sort of manual depth deduction could be possible if CSOs happen coincident with tides

0F-015 US and DS SEWERS

- Meter OF-015 US Sewer was installed in the 45 inch sewer upstream of REG 015 on 10/3/12 at an invert elevation of -0.16
- Meter OF-015 DS Sewer was installed in the 48 inch sewer to the James Street siphon inlet downstream of REG 015 on 10/3/12 at an invert elevation of -1.10 (overflow depth is 40.5 inches)
- The James Street siphon was designed with a capacity of 24 MGD
- The regulator consists of a 7 foot long concrete weir at elevation 2.27
- CSO start and stop times are based on depths greater than 40.5 inches at Meter OF-015 DS Sewer (difficult to estimate small CSOs)
- Velocities at Meters OF-015 US and DS drop from over 2 fps to under 1 fps during CSO events
- CSO volumes are calculated by subtracting the Meter 015 DS Sewer flows from the Meter 015 US Sewer flows

0F-016 OVERFLOW

- Meter OF-016 Overflow was installed in the 48 inch wide by 60 inch high overflow pipe on 8/30/12 at an invert elevation of 0.90
- The regulator consists of an 3.8 foot long weir at an elevation of 3.40
- CSO start and stop times are based on a positive velocities at Meter OF-016 Overflow
- CSO volumes are calculated based on depths and velocities at Meter OF-016 Overflow, the hydraulic elements chart and the Continuity Equation
- There is significant tidal influence at Meter OF-016 Overflow (even though there is a duckbill)
- Unlike OF-003, there is not a meter in the sewer to use an alternative check on Meter OF-016 Overflow
- Some sort of manual depth deduction could be possible if CSOs happen coincident with tides

0F-019 OVERFLOW

- Meter OF-019 Overflow was installed in the 24 inch overflow pipe on 8/13/12 at an invert elevation of 4.80
- The regulator consists of twin 15 inch overflow pipes at an elevation of 6.50
- CSO start and stop times are based on a positive velocities at Meter OF-019 Overflow
- CSO volumes are calculated based on depths and velocities at Meter OF-019 Overflow, the hydraulic elements chart and the Continuity Equation
- There is significant tidal influence at Meter OF-019 Overflow (no duckbill)
- Unlike OF-003, there is not a meter in the sewer to use an alternative check on Meter OF-019 Overflow
- Some sort of manual depth deduction could be possible if CSOs happen coincident with tides

OF-020 SEWER AND OVERFLOW

- Meter OF-020 Overflow (depth sensor) was installed in the 15 inch overflow pipe at REG 021 on 3/25/13 at an invert elevation of 13.95
- Meter OF-020 Sewer was installed in the 24 inch sewer at REG 021 on 3/25/13 at an invert elevation of 11.50 (overflow depth is 30 inches)
- The regulator is a 15 inch pipe
- CSO start and stop times are based on a depth greater than 30 inches at REG-021
- CSO volumes are calculated based on depth over the 30 inches at REG-021 using the hydraulic elements chart and the Continuity Equation